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1 23. WOODY DEBRIS REPLENISHMENT – [MODERATE]

- Bring it to the stream and let the river put it where it wants.
- End dumping cottonwood, willow, redosierdogwood cuttings from bridges, letting them settle out in low energy areas—imitate beavers.
- Placing natural woody materials for movement by the stream at higher flows, (as below).

1.1 Introduction

1.1.1 Description of Technique

Slash, Logs and Trees placed on banks and on bars in channel for easy recruitment
Includes taking debris from reservoirs and upstream of bridges and placing it downstream to restore natural rate of recruitment of debris.

Scale discussion can include importance of this technique for restoring woody debrios supply in the coastal littoral zone. See Chris Maser, et al, From the Mountains to the Sea.

1.1.2 Physical and Biological Effects

- Channel Substrate Sorting and Retention
- Channel Scour
- Grade Control
- Nutrient Retention
- Habitat Complexity
- Upstream Bed Aggradation and Floodplain Interaction
- Floodplain function – roughness, flow spreaders, protect and meter flow into side channels
- Eventually support structure and ecosystems of marine beaches. Oh, you got it. Right on.

1.1.3 Application of Technique

- Define Wood Transport Reach vs. Wood Depositional Reach
- Large Wood Size vs. Stream Power
- Logs vs. stumps vs. trees with root wads
- Alluvial

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- Non-Alluvial
- Applies where wood has been depleted
- How much is enough? Martin Fox of Center for Streamside Studies has recently surveyed 150 stream segments draining basins without human-induced conditions (other than fire suppression) that may influence natural wood loading and retention rates. Base on the assumption that streams draining unmanaged forest basis incorporate the range of conditions that salmonids and other species have adapted to, wood loads these systems provide a reasonable reference for management.
- At reservoirs and bridges
- Mitigation for lost opportunity of debris recruitment

1.2 Scale

Discuss how this technique can range in terms of scale, and whether additional specialized expertise (such as a licensed engineer) may be required (or at least advised). Include scale of small to large landowner.

Large Wood Scale vs. Stream Power

1.3 Risk and Uncertainty

Urban Environments

- Consider safety issues of other water users – consult with them

Rural and Wildland Environments

1.4 Data Collection and Assessment

- Hydrology
- Fluvial Geomorphic Assessment and History
- Watershed Processes and History
- Riparian Area Tree Size Potential – Geomorphically based Riparian Plant Community Classification, i.e., Bud Kovalchik (USFS, 2001), Rex Crawford (WA DNR, 2001), etc.
- Stream Power
- Available Wood Material Size and Quantity

1.5 Methods and Design

- Understand Natural Processes That Have Been and Are Occurring
  - Potential tree size or site class near stream channels
  - Wood Recruitment processes
  - Stream Power (ability to move wood once it enters the channel)
  - Watershed stability (landslides, debris torrents)
  - Historical disturbance (logging, fire, stream cleanout, roads, railroads, floods)
- Available Large Wood Sources
- Field Data Collection
  - ~~L~~woody Debris survey of reach
- Hydrology and Hydraulics
- Matching Natural Process With ~~Large~~ Wood Quality, Quantity and Placement Location.
- Floodplain Wood Loading Needs
  - Roughness requirements in alluvial floodplains to prevent avulsions caused by instream wood loading.

Determine an expected outcome following flood discharges (What happens to the wood when the water is 5 feet higher? Is this consistent with the design size number and locations of the wood?.)

1.6 Project Implementation

1.6.1 Permitting

- Project Wood Volumes, Construction Design and Methods
- Drawings, Plan Views and Maps
- Heavy Equipment Fueling Areas and Spill Plan
- Access Area Rehabilitation Plans

1.6.2 Construction

- Equipment Access Areas
- Equipment Size
- Helicopter additions
- Logging Methods
- Spill Plan
- Source and species/genotype of woody debris supplies for placement

1.6.3 Cost Estimation

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- Investigate work done in King County
- Cost of wood and hauling are cost drivers
- Clear Branch Helicopter additions

1.6.4 Monitoring and Tracking

- Wood Tagging
- Photo Points
- Reach Based Fish Snorkeling –
  - Refer to general biological monitoring techniques that will be used for many restoration techniques
- Spawning Surveys

1.6.5 Contracting Considerations

Time and Materials vs. Construction Contracting
Limitations of hauling debris – large debris with stumps attached
Contractor Experience

1.7 Operations and Maintenance

Relative to objectives and monitoring

1.8 Examples

West Fork of the Hood River
Clear Branch Creek
Tucannon River
Touchet River
Talk with Yakamas about work in Yakima River Basin

1.9 References

References cited in this technique so it is a stand-alone pullout.

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1.10 Photo and Drawing File Names

List filenames and file locations of any photos and drawing files associated with this technique